

This listing of claims will replace all prior versions, and listings, of claims in the application:

**LISTING OF CLAIMS:**

1. (Original) A liquid-crystalline medium having a helically twisted structure comprising a nematic component and an optically active component, wherein:

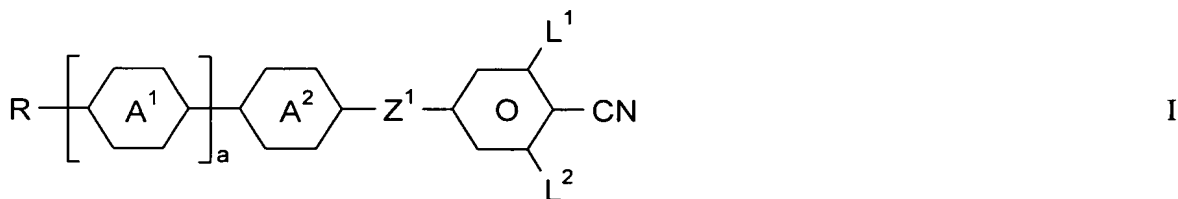
the optically active component comprises one or more chiral compounds whose helical twisting power and concentration are selected in such a way that the helix pitch of the medium is  $\leq 1 \mu\text{m}$ , and

the medium has a birefringence  $\Delta n$  of  $\leq 0.16$ .

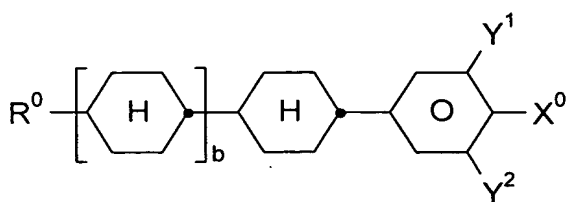
2. (Original) A liquid-crystalline medium having a helically twisted structure comprising a nematic component and an optically active component, wherein:

the optically active component comprises one or more chiral compounds whose helical twisting power and concentration are selected in such a way that the helix pitch of the medium is  $\leq 1 \mu\text{m}$ , and

the nematic component comprises one or more compounds of the formula I



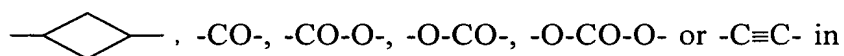
and one or more compounds of the formula II



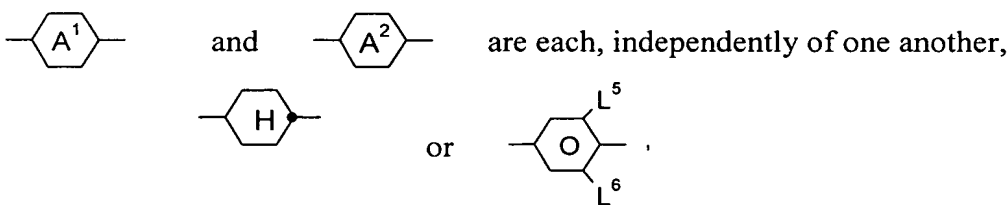
II

in which

$R$  and  $R^0$  are each, independently of one another, H or an alkyl or alkenyl radical having from 1 to 15 carbon atoms which is unsubstituted, monosubstituted by CN or  $CF_3$  or at least monosubstituted by halogen, where one or more  $CH_2$  groups in these radicals are optionally, independently of one another, replaced by -O-, -S-,



such a way that O atoms are not linked directly to one another,



$L^1$ ,  $L^2$ ,  $L^5$  and  $L^6$  are each, independently of one another, H or F,

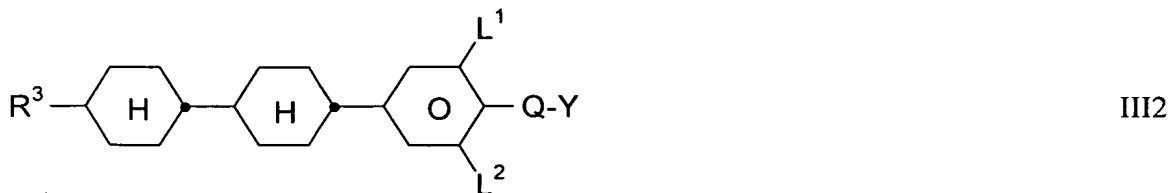
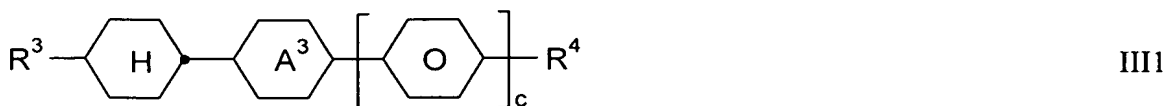
$Z^1$  is -COO- or, if at least one of the radicals  $A^1$  and  $A^2$  is trans-1,4-cyclohexylene, is alternatively - $CH_2CH_2$ - or a single bond,

$Y^1$  and  $Y^2$  are each, independently of one another, H or F,

$X^0$  is F, Cl, CN, halogenated alkyl, alkenyl or alkoxy having from 1 to 6 carbon atoms, and

$a$  and  $b$  are each, independently of one another, 0 or 1.

3. (Currently Amended) A medium according to Claim 2, ~~with~~ which additionally comprises one or more alkenyl compounds selected from the following formulae:



in which

$A^3$  is 1,4-phenylene or trans-1,4-cyclohexylene,

$c$  is 0 or 1,

$R^3$  is an alkenyl group having from 2 to 7 carbon atoms,

$R^4$  is an alkyl, alkoxy or alkenyl group having from 1 to 12 carbon atoms, in which one or two non-adjacent  $\text{CH}_2$  groups are optionally replaced by -O-, -CH=CH-, -C≡C-, -CO-, -OCO- or -COO- in such a way that O atoms are not linked directly to one another,

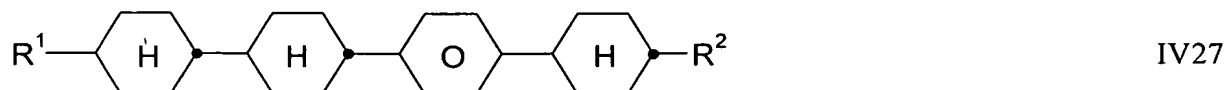
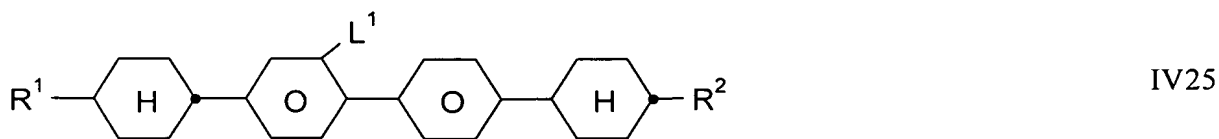
Q is  $\text{CF}_2$ ,  $\text{OCF}_2$ , CFH, OCFH or a single bond,

Y is F or Cl, and

$L^1$  and  $L^2$  are each, independently of one another, H or F,

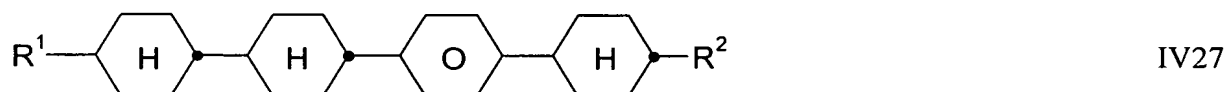
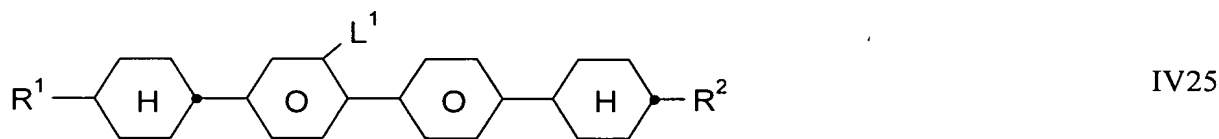
provided that when the compound is of formula III2, it is different from the compound of formula II in the medium.

4. **(Original)** A medium according to Claim 2, which additionally comprises one or more compounds selected from the following formulae:



in which  $R^1$  and  $R^2$  have one of the meanings indicated for R in the formula I, and L is H or F.

5. **(Original)** A medium according to Claim 3, which additionally comprises one or more compounds selected from the following formulae:



in which  $R^1$  and  $R^2$  have one of the meanings indicated for R in the formula I, and L is H or F.

6. **(Original)** A medium according to Claim 2, wherein the proportion of compounds of the formula I in the mixture as a whole is from 7 to 80% by weight.

7. **(Original)** A medium according to Claim 2, wherein the proportion of compounds of the formula II in the mixture as a whole is from 5 to 50% by weight.

8. **(Original)** A medium according to Claim 2, wherein the proportion of the optically active component is from 0.01 to 7%.

9. **(Original)** A medium according to Claim 2, wherein the medium has a reflection wavelength in the range from 400 to 800 nm.

10. **(Currently Amended)** A medium according to Claim 2, wherein the medium has a birefringence  ~~$\Delta n$  of  $< 0.16$~~   $\Delta n$  of  $\leq 0.16$ .

11. **(Original)** An electro-optical liquid-crystal display containing a liquid-crystalline medium according Claim 1.

12. **(Original)** An electro-optical liquid-crystal display containing a liquid-crystalline medium according Claim 2.

13. **(Original)** An electro-optical liquid-crystal display according to Claim 11, which display is a cholesteric, SSCT, PSCT or flexoelectric display.

**14. (Original)** An electro-optical liquid-crystal display according to Claim 12, which display is a cholesteric, SSCT, PSCT or flexoelectric display.

**15. (New)** An electro-optical liquid-crystal display according to Claim 11, wherein the display has a layer thickness of the liquid crystal cell,  $d$ , and the medium has a helix pitch,  $p$ , such that the ratio  $d/p$  is from 2 to 20.

**16. (New)** An electro-optical liquid-crystal display according to Claim 12, wherein the display has a layer thickness of the liquid crystal cell,  $d$ , and the medium has a helix pitch,  $p$ , such that the ratio  $d/p$  is from 2 to 20.

**17. (New)** A medium according to claim 1, wherein the helix pitch of the medium is from 200 nm to 750 nm.

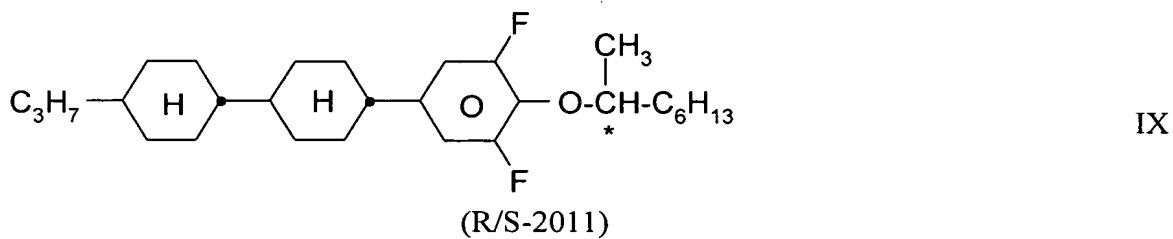
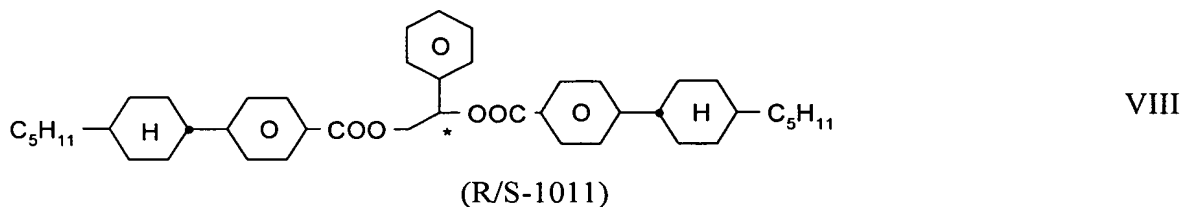
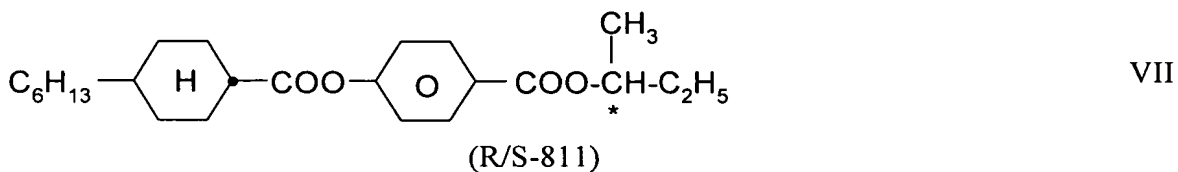
**18. (New)** A medium according to claim 2, wherein the helix pitch of the medium is from 200 nm to 750 nm.

**19. (New)** A medium according to claim 1, wherein the optically active component exhibits a helical twisting power of  $20 \mu\text{m}^{-1}$  or more.

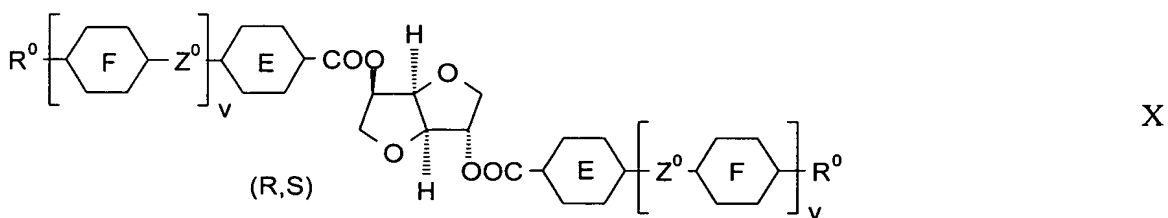
**20. (New)** A medium according to claim 2, wherein the optically active component exhibits a helical twisting power of  $20 \mu\text{m}^{-1}$  or more.

21. (New) A medium according to claim 1, wherein the optically active component includes at least one compound of the following:

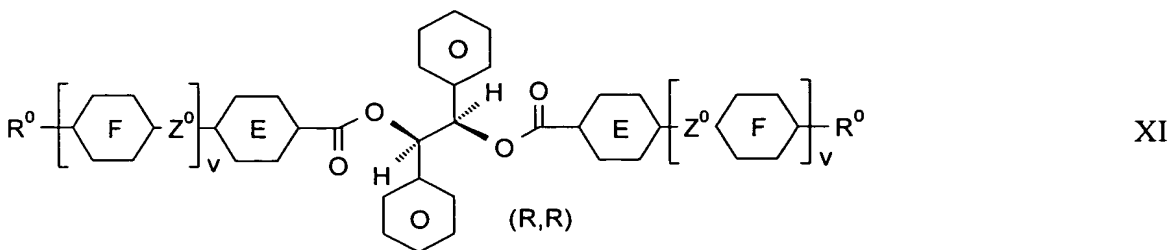
- cholesteryl nonanoate,
- compounds of the formulae VII to IX:



- compounds of the formula X:



- compounds of the formula XI:



wherein, in formula X and XI,

E and F are each, independently of one another; 1,4-phenylene, which is optionally monosubstituted, disubstituted or trisubstituted by L; or 1,4-cyclohexylene,

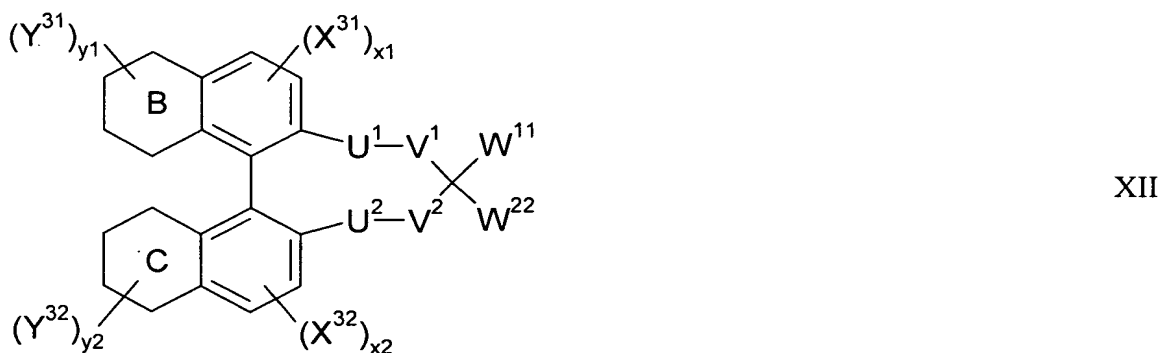
L is H, F, Cl, CN or optionally halogenated alkyl, alkoxy, alkylcarbonyl, alkoxycarbonyl or alkoxycarbonyloxy having 1-7 carbon atoms,

v is 0 or 1,

Z<sup>0</sup> is -COO-, -OCO-, -CH<sub>2</sub>CH<sub>2</sub>- or a single bond, and

R is alkyl, alkoxy, alkylcarbonyl, alkoxycarbonyl or alkylcarbonyloxy having 1-12 carbon atoms,

compounds of the formula XII:



in which:

X<sup>31</sup>, X<sup>32</sup>, Y<sup>31</sup> and Y<sup>32</sup> are each, independently of one another: H; F; Cl; Br; I; CN; SCN; SF<sub>5</sub>; straight-chain or branched alkyl having up to 25 carbon atoms, unsubstituted



or monosubstituted or polysubstituted by F, Cl, Br, I or CN, and in which one or more non-adjacent CH<sub>2</sub> group, independently of one another, are optionally replaced by -O-, -S-, -NH-, -NR<sup>00</sup>-, -CO-, -COO-, -OCO-, -OCO-O-, -S-CO-, -CO-S-, -CH=CH- or -C≡C- in such a way that O and/or S atoms are not linked directly to one another; a polymerizable group; cycloalkyl or aryl having up to 20 carbon atoms, which are optionally monosubstituted or polysubstituted by L or a polymerizable group,

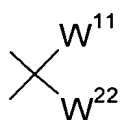
R<sup>00</sup> is H or alkyl having from 1 to 4 carbon atoms,

x<sup>1</sup> and x<sup>2</sup> are each, independently of one another, 0, 1 or 2,

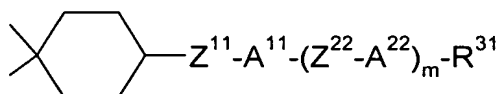
y<sup>1</sup> and y<sup>2</sup> are each, independently of one another, 0, 1, 2, 3 or 4,

B and C are each, independently of one another, an aromatic or partially or fully saturated aliphatic six-membered ring, in which one or more CH groups are optionally replaced by N and one or more CH<sub>2</sub> groups are optionally replaced by O and/or S,

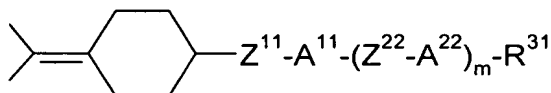
one of the radicals W<sup>11</sup> and W<sup>22</sup> is -Z<sup>11</sup>-A<sup>11</sup>-(Z<sup>22</sup>-A<sup>22</sup>)<sub>m</sub>-R<sup>31</sup> and the other is R<sup>32</sup> or A<sup>33</sup>, or both radicals W<sup>11</sup> and W<sup>22</sup> are -Z<sup>11</sup>-A<sup>11</sup>-(Z<sup>22</sup>-A<sup>22</sup>)<sub>m</sub>-R<sup>31</sup>, where W<sup>1</sup> and W<sup>2</sup> are not simultaneously H, or



is

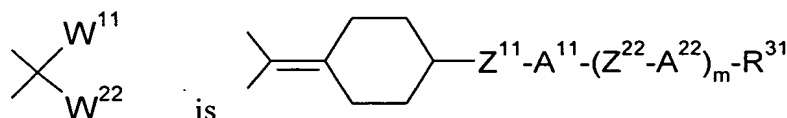


or



U<sup>1</sup> and U<sup>2</sup> are each, independently of one another, CH<sub>2</sub>, O, S, CO or CS,

$V^1$  and  $V^2$  are each, independently of one another,  $(CH_2)_n$ , in which up to four non-adjacent  $CH_2$  groups are optionally replaced by O and/or S, and one of the radicals  $V^1$  and  $V^2$  or, if



one or both radicals  $V^1$  and  $V^2$  are alternatively a single bond,

$n$  is an integer from 1 to 7,

$Z^{11}$  and  $Z^{22}$  are each, independently of one another, -O-, -S-, -CO-, -COO-, -OCO-, -O-COO-, -CO-NR<sup>00</sup>-, -NR<sup>00</sup>-CO-, -OCH<sub>2</sub>-, -CH<sub>2</sub>O-, -SCH<sub>2</sub>-, -CH<sub>2</sub>S-, -CF<sub>2</sub>O-, -OCF<sub>2</sub>-, -CF<sub>2</sub>S-, -SCF<sub>2</sub>-, -CH<sub>2</sub>CH<sub>2</sub>-, -CF<sub>2</sub>CH<sub>2</sub>-, -CH<sub>2</sub>CF<sub>2</sub>-, -CF<sub>2</sub>CF<sub>2</sub>-, -CH=CH-, -CH=N-, -N=CH-, -N=N-, -CF=CH-, -CH=CF-, -CF=CF-, -C≡C-, -CH=CH-COO-, -OCO-CH=CH- or a single bond,

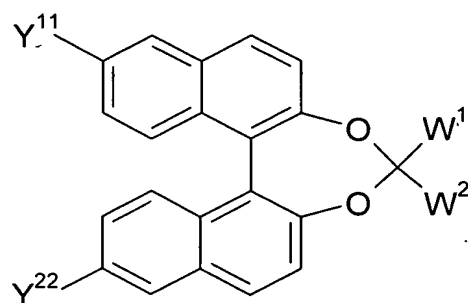
$A^{11}$ ,  $A^{22}$  and  $A^{33}$  are each, independently of one another: 1,4-phenylene, in which, in addition, one or more CH groups are optionally replaced by N; 1,4-cyclohexylene, in which, one or more non-adjacent  $CH_2$  groups are optionally replaced by O and/or S; 1,3-dioxolane-4,5-diyl; 1,4-cyclohexenylenyl; 1,4-bicyclo[2.2.2]octylene; piperidine-1,4-diyl; naphthalene-2,6-diyl; decahydronaphthalene-2,6-diyl; or 1,2,3,4-tetrahydronaphthalene-2,6-diyl; where all these groups are unsubstituted or monosubstituted or polysubstituted by L, and  $A^{11}$  is alternatively a single bond,

L is halogen, CN, NO<sub>2</sub> or an alkyl, alkoxy, alkylcarbonyl or alkoxycarbonyl group having from 1 to 7 carbon atoms, in which one or more H atoms are optionally replaced by F or Cl,

m is in each case, independently of one another, 0, 1, 2 or 3, and

$R^{31}$  and  $R^{32}$  are each, independently of one another: H; F; Cl; Br; I; CN; SCN; OH;  $SF_5$ ; straight-chain or branched alkyl having up to 25 carbon atoms, which is unsubstituted or monosubstituted or polysubstituted by F, Cl, Br, I or CN, and in which, one or more non-adjacent  $CH_2$  groups, each independently of one another, are optionally replaced by -O-, -S-, -NH-,  $-NR^{00}$ -, -CO-, -COO-, -OCO-, -OCO-O-, -S-CO-, -CO-S-, -CH=CH- or  $-C\equiv C-$  in such a way that O and/or S atoms are not linked directly to one another; or a polymerizable group,

- compounds of the formula XIII:

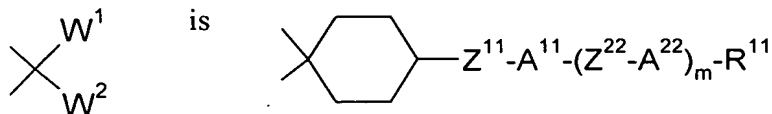


XIII

in which:

$Y^{11}$  and  $Y^{22}$  are each, independently of one another: H; F; Cl; Br; I; CN; SCN;  $SF_5$ ; a chiral or achiral alkyl having up to 30 carbon atoms, which is optionally unsubstituted or monosubstituted or polysubstituted by F, Cl, Br, I or CN, and in which one or more non-adjacent  $CH_2$  groups are each, independently of one another, optionally replaced by -O-, -S-, -NH-,  $-N(CH_3)$ -, -CO-, -COO-, -OCO-, -OCO-O-, -S-CO-, -CO-S-, -CH=CH- or  $-C\equiv C-$  in such a way that O atoms are not linked directly to one another; or a polymerizable group,

one of the radicals  $W^1$  and  $W^2$  is  $-Z^{11}-A^{11}-(Z^{22}-A^{22})_m-R^{11}$  and the other is H,  $R^{22}$  or  $A^{33}$ , or both radicals  $W^1$  and  $W^2$  are  $-Z^1-A^1-(Z^2-A^2)_m-R$ , where  $W^1$  and  $W^2$  are not simultaneously H, or



$Z^{11}$  and  $Z^{22}$  are each, independently of one another, -O-, -S-, -CO-, -COO-, -OCO-, -O-COO-, -CO-N( $R^{00}$ )-, -N( $R^{00}$ )-CO-, -OCH<sub>2</sub>-, -CH<sub>2</sub>O-, -SCH<sub>2</sub>-, -CH<sub>2</sub>S-, -CF<sub>2</sub>O-, -OCF<sub>2</sub>-, -CF<sub>2</sub>S-, -SCF<sub>2</sub>-, -CH<sub>2</sub>CH<sub>2</sub>-, -CF<sub>2</sub>CH<sub>2</sub>-, -CH<sub>2</sub>CF<sub>2</sub>-, -CF<sub>2</sub>CF<sub>2</sub>-, -CH=CH-, -CH=N-, -N=CH-, -N=N-, -CF=CH-, -CH=CF-, -CF=CF-, -C≡C-, -CH=CH-COO-, -OCO-CH=CH- or a single bond,

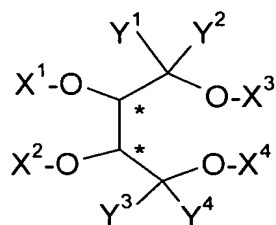
$R^{00}$  is H or alkyl having from 1 to 4 carbon atoms,

$A^{11}$ ,  $A^{22}$  and  $A^{33}$  are each, independently of one another: 1,4-phenylene, in which, one or more CH groups are optionally replaced by N; 1,4-cyclohexylene, in which one or more non-adjacent CH<sub>2</sub> groups are optionally replaced by O and/or S; 1,3-dioxolane-4,5-diyl; 1,4-cyclohexenylenyl; 1,4-bicyclo[2.2.2]octylene; piperidine-1,4-diyl; naphthalene-2,6-diyl; decahydronaphthalene-2,6-diyl; or 1,2,3,4-tetrahydronaphthalene-2,6-diyl, where all these groups are unsubstituted or monosubstituted or polysubstituted by halogen, CN or NO<sub>2</sub> or alkyl, alkoxy, alkylcarbonyl or alkoxycarbonyl having from 1 to 7 carbon atoms, in which one or more H atoms are optionally replaced by F or Cl, and  $A^{11}$  is alternatively a single bond,

$m$  is 0, 1, 2 or 3, and

$R^{11}$  and  $R^{22}$  are each, independently of one another, as defined for  $Y^{11}$ ,

- compounds of formula XIV



XIV

in which

$X^1$  and  $X^2$  are H, or together form a bivalent radical selected from the group consisting of  $-\text{CH}_2-$ ,  $-\text{CHR}^{11}-$ ,  $-\text{CR}^{11}_2-$ ,  $-\text{SiR}^{11}_2-$  and 1,1-cycloalkylidene,

$X^3$  and  $X^4$  have one of the meanings indicated for  $X^1$  and  $X^2$ ,

$Y^1$ ,  $Y^2$ ,  $Y^3$  and  $Y^4$  may be identical or different and are each, independently of one another,  $\text{R}^{11}$ , A or  $\text{M-R}^{22}$ ,

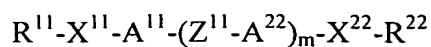
A is a cyclic group,

M is a mesogenic group, and

$\text{R}^{11}$  and  $\text{R}^{22}$  are each, independently of one another: H; F; Cl; Br; CN; SCN;  $\text{SF}_5$ ; a chiral or achiral alkyl having up to 30 carbon atoms, which is unsubstituted or monosubstituted or polysubstituted by F, Cl, Br, I or CN, and in which one or more non-adjacent  $\text{CH}_2$  groups are each, independently of one another, optionally replaced by  $-\text{O}-$ ,  $-\text{S}-$ ,  $-\text{NH}-$ ,  $-\text{N}(\text{CH}_3)-$ ,  $-\text{CO}-$ ,  $-\text{COO}-$ ,  $-\text{OCO}-$ ,  $-\text{OCO-O}-$ ,  $-\text{S-CO}-$ ,  $-\text{CO-S}-$ ,  $-\text{CH=CH}-$  or  $-\text{C}\equiv\text{C}-$  in such a way that O atoms are not linked directly to one another; or are a polymerizable group,

where at least one of the radicals  $Y^1$ ,  $Y^2$ ,  $Y^3$  and  $Y^4$  is  $\text{M-R}^{22}$ ,

- compounds of the formula XV



XV

in which

$R^{11}$  and  $R^{22}$  are each, independently of one another: H; F; Cl; Br; CN; SCN;  $SF_5$ ; a chiral or achiral alkyl having up to 30 carbon atoms, which is unsubstituted or monosubstituted or polysubstituted by F, Cl, Br, I or CN, and in which one or more non-adjacent  $CH_2$  groups are each, independently of one another, optionally replaced by -O-, -S-, -NH-, -N(CH<sub>3</sub>)-, -CO-, -COO-, -OCO-, -OCO-O-, -S-CO-, -CO-S-, -CH=CH- or -C≡C- in such a way that O atoms are not linked directly to one another; a chiral radical containing one or more aromatic or aliphatic ring groups, which optionally contains fused or spiro-linked rings and one or more heteroatoms; or a polymerizable group,

$X^{11}$  and  $X^{22}$  are each, independently of one another, -CF<sub>2</sub>O-, -OCF<sub>2</sub>-, -CF<sub>2</sub>S-, -SCF<sub>2</sub>-, -CF<sub>2</sub>CH<sub>2</sub>-, -CH<sub>2</sub>CF<sub>2</sub>-, -CF<sub>2</sub>CF<sub>2</sub>-, -CF=CH-, -CH=CF-, -CF=CF- or a single bond,

$Z^{11}$  is in each case, independently of one another, -O-, -S-, -CO-, -COO-, -OCO-, -O-COO-, -CO-N(R<sup>00</sup>)-, -N(R<sup>00</sup>)-CO-, -OCH<sub>2</sub>-, -CH<sub>2</sub>O-, -SCH<sub>2</sub>-, -CH<sub>2</sub>S-, -CF<sub>2</sub>O-, -OCF<sub>2</sub>-, -CF<sub>2</sub>S-, -SCF<sub>2</sub>-, -CH<sub>2</sub>CH<sub>2</sub>-, -CF<sub>2</sub>CH<sub>2</sub>-, -CH<sub>2</sub>CF<sub>2</sub>-, -CF<sub>2</sub>CF<sub>2</sub>-, -CH=CH-, -CF=CH-, -CH=CF-, -CF=CF-, -C≡C-, -CH=CH-COO-, -OCO-CH=CH- or a single bond,

$R^{00}$  is H or alkyl having from 1 to 4 carbon atoms,

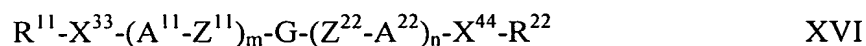
$A^{11}$  and  $A^{22}$  are each, independently of one another: 1,4-phenylene, in which, in addition, one or more CH groups are optionally replaced by N; 1,4-cyclohexylene, in which one or two non-adjacent  $CH_2$  groups are optionally replaced by O and/or S; 1,3-dioxolane-4,5-diyl; cyclohexenylen; bicyclo[2.2.2]octylene; piperidine-1,4-diyl; naphthalene-2,6-diyl; decahydronaphthalene-2,6-diyl; or 1,2,3,4-tetrahydronaphthalene-2,6-

diyl, where all of these groups are unsubstituted or monosubstituted or polysubstituted by halogen, CN or NO<sub>2</sub> or alkyl, alkoxy, alkylcarbonyl or alkoxy carbonyl having from 1 to 7 carbon atoms, in which one or more H atoms are optionally replaced by F or Cl, and

m is 1, 2, 3, 4 or 5,

provided that at least one of the radicals X<sup>11</sup>, X<sup>22</sup> and Z<sup>11</sup> is -CF<sub>2</sub>O-, -OCF<sub>2</sub>-, -CF<sub>2</sub>S-, -SCF<sub>2</sub>-, -CF<sub>2</sub>CH<sub>2</sub>-, -CF<sub>2</sub>CF<sub>2</sub>-, -CF=CH- or -CF=CF- and at least one of the radicals R<sup>11</sup> and R<sup>22</sup> is a chiral group,

- compounds of the formula XVI



in which

R<sup>11</sup> and R<sup>22</sup> are each, independently of one another: H; F; Cl; Br; CN; SCN; SF<sub>5</sub>; or a chiral or achiral alkyl having up to 30 carbon atoms, which is unsubstituted or monosubstituted or polysubstituted by F, Cl, Br, I or CN, and in which one or more non-adjacent CH<sub>2</sub> groups are each, independently of one another, optionally replaced by -O-, -S-, -NH-, -N(CH<sub>3</sub>)-, -CO-, -COO-, -OCO-, -OCO-O-, -S-CO-, -CO-S-, -CH=CH- or -C≡C- in such a way that O atoms are not linked directly to one another; or a polymerizable group,

X<sup>33</sup>, X<sup>44</sup>, Z<sup>11</sup> and Z<sup>22</sup> are each, independently of one another, -O-, -S-, -CO-, -COO-, -OCO-, -O-COO-, -CO-N(R<sup>00</sup>)-, -N(R<sup>00</sup>)-CO-, -OCH<sub>2</sub>-, -CH<sub>2</sub>O-, -SCH<sub>2</sub>-, -CH<sub>2</sub>S-, -CF<sub>2</sub>O-, -OCF<sub>2</sub>-, -CF<sub>2</sub>S-, -SCF<sub>2</sub>-, -CH<sub>2</sub>CH<sub>2</sub>-, -CF<sub>2</sub>CH<sub>2</sub>-, -CH<sub>2</sub>CF<sub>2</sub>-, -CF<sub>2</sub>CF<sub>2</sub>-, -CH=CH-, -CF=CH-, -CH=CF-, -CF=CF-, -C≡C-, -CH=CH-COO-, -OCO-CH=CH- or a single bond,

R<sup>00</sup> is H or alkyl having from 1 to 4 carbon atoms,

A<sup>11</sup> and A<sup>22</sup> are each, independently of one another: 1,4-phenylene, in which one or more CH groups are optionally replaced by N; 1,4-cyclohexylene, in which one or two non-adjacent CH<sub>2</sub> groups are optionally replaced by O and/or S; 1,3-dioxolane-4,5-diyl; cyclohexenylene; bicyclo[2.2.2]octylene; piperidine-1,4-diyl; naphthalene-2,6-diyl; decahydronaphthalene-2,6-diyl; or 1,2,3,4-tetrahydronaphthalene-2,6-diyl; where all these groups are unsubstituted or monosubstituted or polysubstituted by halogen, CN or NO<sub>2</sub> or alkyl, alkoxy, alkylcarbonyl or alkoxy carbonyl having from 1 to 7 carbon atoms, in which one or more H atoms are optionally replaced by F or Cl,

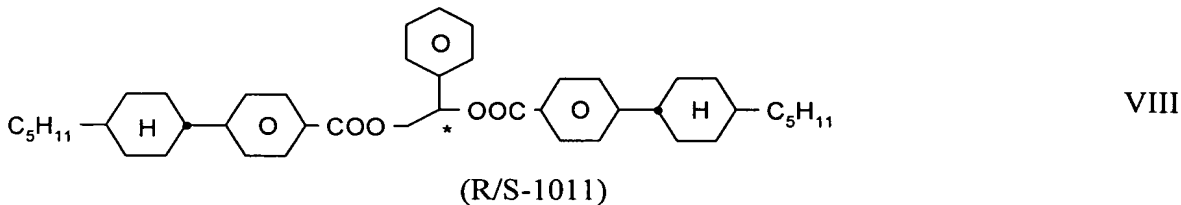
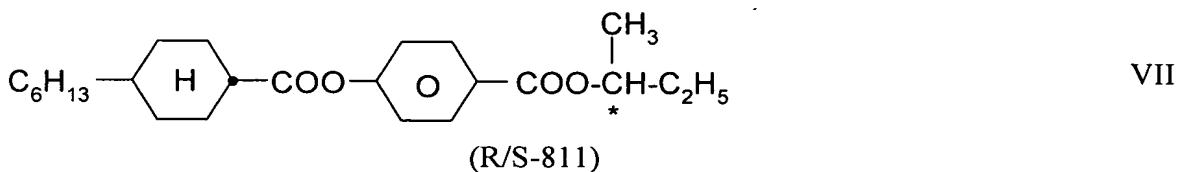
m and n are each, independently of one another, 1, 2, 3 or 4, and

G is a bivalent chiral group,

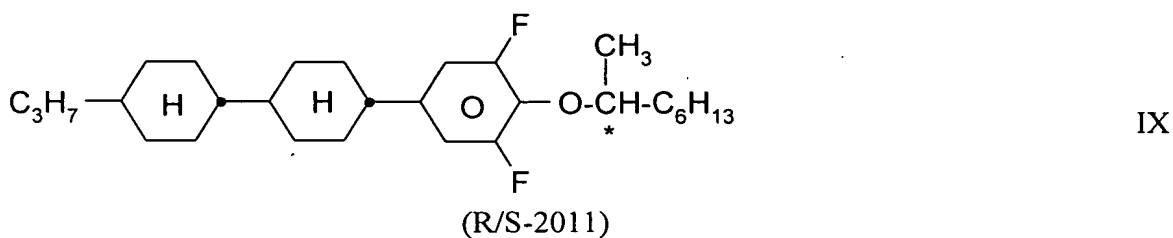
in which at least one of the radicals X<sup>33</sup>, X<sup>44</sup>, Z<sup>11</sup> and Z<sup>22</sup> is -CF<sub>2</sub>O-, -OCF<sub>2</sub>-, -CF<sub>2</sub>S-, -SCF<sub>2</sub>-, -CF<sub>2</sub>CH<sub>2</sub>-, -CF<sub>2</sub>CF<sub>2</sub>-, -CF=CH- or -CF=CF-.

**22. (New)** A medium according to claim 2, wherein the optically active component includes at least one compound of the following:

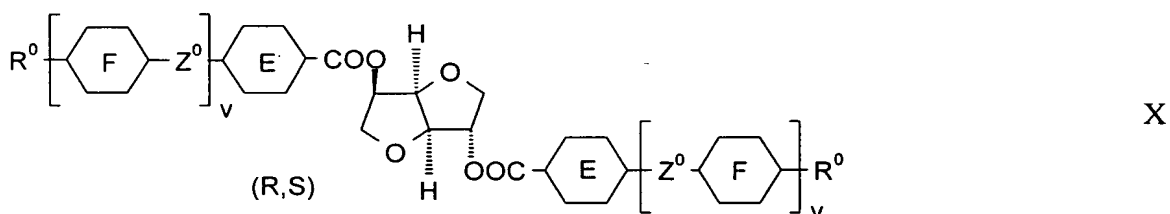
- cholesteryl nonanoate,
- compounds of the formulae VII to IX:



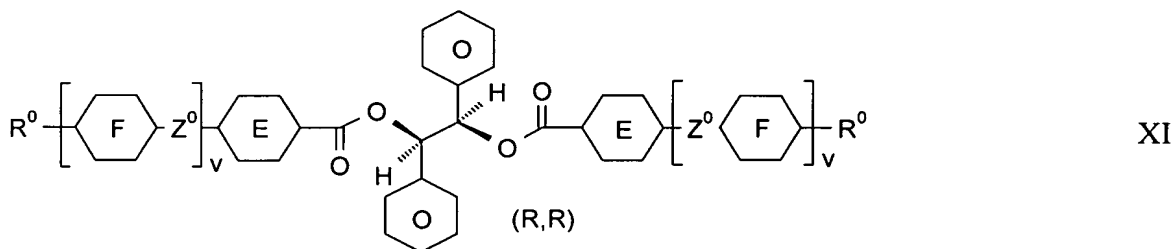




- compounds of the formula X:



- compounds of the formula XI:



wherein, in formula X and XI,

E and F are each, independently of one another; 1,4-phenylene, which is optionally monosubstituted, disubstituted or trisubstituted by L; or 1,4-cyclohexylene,

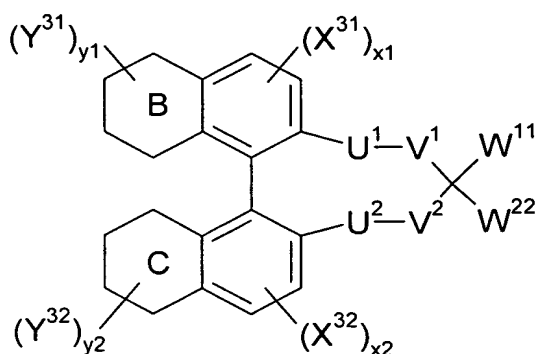
L is H, F, Cl, CN or optionally halogenated alkyl, alkoxy, alkylcarbonyl, alkoxy carbonyl or alkoxy carbonyloxy having 1-7 carbon atoms,

v is 0 or 1,

$Z^0$  is  $-\text{COO}-$ ,  $-\text{OCO}-$ ,  $-\text{CH}_2\text{CH}_2-$  or a single bond, and

R is alkyl, alkoxy, alkylcarbonyl, alkoxy carbonyl or alkylcarbonyloxy having 1-12 carbon atoms,

compounds of the formula XII:



in which:

$X^{31}$ ,  $X^{32}$ ,  $Y^{31}$  and  $Y^{32}$  are each, independently of one another: H; F; Cl; Br; I; CN; SCN;  $\text{SF}_5$ ; straight-chain or branched alkyl having up to 25 carbon atoms, optionally unsubstituted or monosubstituted or polysubstituted by F, Cl, Br, I or CN, and in which one or more non-adjacent  $\text{CH}_2$  group, independently of one another, are optionally replaced by  $-\text{O}-$ ,  $-\text{S}-$ ,  $-\text{NH}-$ ,  $-\text{NR}^{00}-$ ,  $-\text{CO}-$ ,  $-\text{COO}-$ ,  $-\text{OCO}-$ ,  $-\text{OCO-O}-$ ,  $-\text{S-CO}-$ ,  $-\text{CO-S}-$ ,  $-\text{CH=CH}-$  or  $-\text{C}\equiv\text{C}-$  in such a way that O and/or S atoms are not linked directly to one another; a polymerizable group; cycloalkyl or aryl having up to 20 carbon atoms, which are optionally monosubstituted or polysubstituted by L or a polymerizable group,

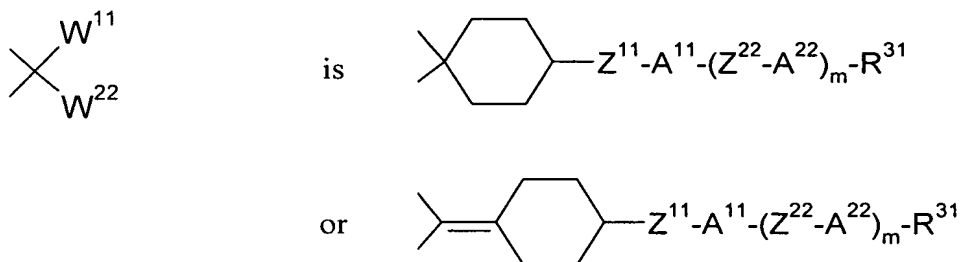
$\text{R}^{00}$  is H or alkyl having from 1 to 4 carbon atoms,

$x^1$  and  $x^2$  are each, independently of one another, 0, 1 or 2,

$y^1$  and  $y^2$  are each, independently of one another, 0, 1, 2, 3 or 4,

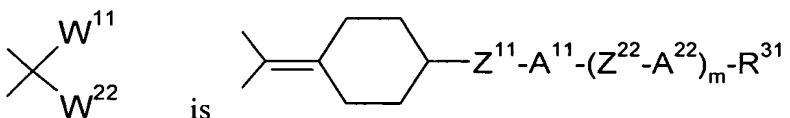
B and C are each, independently of one another, an aromatic or partially or fully saturated aliphatic six-membered ring, in which one or more CH groups are optionally replaced by N and one or more CH<sub>2</sub> groups are optionally replaced by O and/or S,

one of the radicals W<sup>11</sup> and W<sup>22</sup> is -Z<sup>11</sup>-A<sup>11</sup>-(Z<sup>22</sup>-A<sup>22</sup>)<sub>m</sub>-R<sup>31</sup> and the other is R<sup>32</sup> or A<sup>33</sup>, or both radicals W<sup>11</sup> and W<sup>22</sup> are -Z<sup>11</sup>-A<sup>11</sup>-(Z<sup>22</sup>-A<sup>22</sup>)<sub>m</sub>-R<sup>31</sup>, where W<sup>1</sup> and W<sup>2</sup> are not simultaneously H, or



U<sup>1</sup> and U<sup>2</sup> are each, independently of one another, CH<sub>2</sub>, O, S, CO or CS,

V<sup>1</sup> and V<sup>2</sup> are each, independently of one another, (CH<sub>2</sub>)<sub>n</sub>, in which up to four non-adjacent CH<sub>2</sub> groups are optionally replaced by O and/or S, and one of the radicals V<sup>1</sup> and V<sup>2</sup> or, if



one or both radicals V<sup>1</sup> and V<sup>2</sup> are alternatively a single bond,

n is an integer from 1 to 7,

Z<sup>11</sup> and Z<sup>22</sup> are each, independently of one another, -O-, -S-, -CO-, -COO-, -OCO-, -O-COO-, -CO-NR<sup>00</sup>-, -NR<sup>00</sup>-CO-, -OCH<sub>2</sub>-, -CH<sub>2</sub>O-, -SCH<sub>2</sub>-, -CH<sub>2</sub>S-, -CF<sub>2</sub>O-, -OCF<sub>2</sub>-, -CF<sub>2</sub>S-, -SCF<sub>2</sub>-, -CH<sub>2</sub>CH<sub>2</sub>-, -CF<sub>2</sub>CH<sub>2</sub>-, -CH<sub>2</sub>CF<sub>2</sub>-, -CF<sub>2</sub>CF<sub>2</sub>-, -CH=CH-, -CH=N-,

-N=CH-, -N=N-, -CF=CH-, -CH=CF-, -CF=CF-, -C≡C-, -CH=CH-COO-, -OCO-CH=CH- or a single bond,

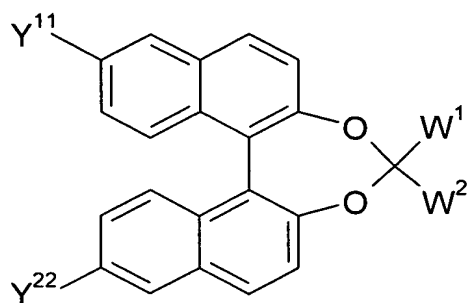
A<sup>11</sup>, A<sup>22</sup> and A<sup>33</sup> are each, independently of one another: 1,4-phenylene, in which, in addition, one or more CH groups are optionally replaced by N; 1,4-cyclohexylene, in which, one or more non-adjacent CH<sub>2</sub> groups are optionally replaced by O and/or S; 1,3-dioxolane-4,5-diyl; 1,4-cyclohexenylene; 1,4-bicyclo[2.2.2]octylene; piperidine-1,4-diyl; naphthalene-2,6-diyl; decahydronaphthalene-2,6-diyl; or 1,2,3,4-tetrahydronaphthalene-2,6-diyl; where all these groups are unsubstituted or monosubstituted or polysubstituted by L, and A<sup>11</sup> is alternatively a single bond,

L is halogen, CN, NO<sub>2</sub> or an alkyl, alkoxy, alkylcarbonyl or alkoxy carbonyl group having from 1 to 7 carbon atoms, in which one or more H atoms are optionally replaced by F or Cl,

m is in each case, independently of one another, 0, 1, 2 or 3, and

R<sup>31</sup> and R<sup>32</sup> are each, independently of one another: H; F; Cl; Br; I; CN; SCN; OH; SF<sub>5</sub>; straight-chain or branched alkyl having up to 25 carbon atoms, which is unsubstituted or monosubstituted or polysubstituted by F, Cl, Br, I or CN, and in which, one or more non-adjacent CH<sub>2</sub> groups, each independently of one another, are optionally replaced by -O-, -S-, -NH-, -NR<sup>00</sup>-, -CO-, -COO-, -OCO-, -OCO-O-, -S-CO-, -CO-S-, -CH=CH- or -C≡C- in such a way that O and/or S atoms are not linked directly to one another; or a polymerizable group,

- compounds of the formula XIII:

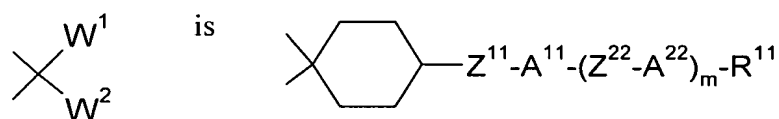


XIII

in which:

$Y^{11}$  and  $Y^{22}$  are each, independently of one another: H; F; Cl; Br; I; CN; SCN;  $SF_5$ ; a chiral or achiral alkyl having up to 30 carbon atoms, which is unsubstituted or monosubstituted or polysubstituted by F, Cl, Br, I or CN, and in which one or more non-adjacent  $CH_2$  groups are each, independently of one another, optionally replaced by -O-, -S-, -NH-, -N(CH<sub>3</sub>)-, -CO-, -COO-, -OCO-, -OCO-O-, -S-CO-, -CO-S-, -CH=CH- or -C≡C- in such a way that O atoms are not linked directly to one another; or a polymerizable group,

one of the radicals  $W^1$  and  $W^2$  is  $-Z^{11}-A^{11}-(Z^{22}-A^{22})_m-R^{11}$  and the other is H,  $R^{22}$  or  $A^{33}$ , or both radicals  $W^1$  and  $W^2$  are  $-Z^1-A^1-(Z^2-A^2)_m-R$ , where  $W^1$  and  $W^2$  are not simultaneously H, or



$Z^{11}$  and  $Z^{22}$  are each, independently of one another, -O-, -S-, -CO-, -COO-, -OCO-, -O-COO-, -CO-N( $R^{00}$ )-, -N( $R^{00}$ )-CO-, -OCH<sub>2</sub>-, -CH<sub>2</sub>O-, -SCH<sub>2</sub>-, -CH<sub>2</sub>S-, -CF<sub>2</sub>O-, -OCF<sub>2</sub>-, -CF<sub>2</sub>S-, -SCF<sub>2</sub>-, -CH<sub>2</sub>CH<sub>2</sub>-, -CF<sub>2</sub>CH<sub>2</sub>-, -CH<sub>2</sub>CF<sub>2</sub>-, -CF<sub>2</sub>CF<sub>2</sub>-, -CH=CH-, -CH=N-, -N=CH-, -N=N-, -CF=CH-, -CH=CF-, -CF=CF-, -C≡C-, -CH=CH-COO-, -OCO-CH=CH- or a single bond,

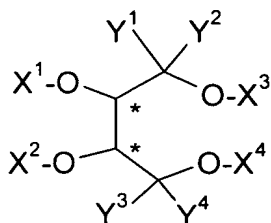
$R^{00}$  is H or alkyl having from 1 to 4 carbon atoms,

$A^{11}$ ,  $A^{22}$  and  $A^{33}$  are each, independently of one another: 1,4-phenylene, in which, one or more CH groups are optionally replaced by N; 1,4-cyclohexylene, in which one or more non-adjacent  $CH_2$  groups are optionally replaced by O and/or S; 1,3-dioxolane-4,5-diyl; 1,4-cyclohexenylenylene; 1,4-bicyclo[2.2.2]octylene; piperidine-1,4-diyl; naphthalene-2,6-diyl; decahydronaphthalene-2,6-diyl; or 1,2,3,4-tetrahydronaphthalene-2,6-diyl, where all these groups are unsubstituted or monosubstituted or polysubstituted by halogen, CN or  $NO_2$  or alkyl, alkoxy, alkylcarbonyl or alkoxy carbonyl having from 1 to 7 carbon atoms, in which one or more H atoms are optionally replaced by F or Cl, and  $A^{11}$  is alternatively a single bond,

m is 0, 1, 2 or 3, and

$R^{11}$  and  $R^{22}$  are each, independently of one another, as defined for  $Y^{11}$ ,

- compounds of formula XIV



XIV

in which

$X^1$  and  $X^2$  are H, or together form a bivalent radical selected from the group consisting of  $-CH_2-$ ,  $-CHR^{11}-$ ,  $-CR^{11}_2-$ ,  $-SiR^{11}_2-$  and 1,1-cycloalkylidene,

$X^3$  and  $X^4$  have one of the meanings indicated for  $X^1$  and  $X^2$ ,

$Y^1$ ,  $Y^2$ ,  $Y^3$  and  $Y^4$  may be identical or different and are each, independently of one another,  $R^{11}$ , A or  $M-R^{22}$ ,

A is a cyclic group,

M is a mesogenic group, and

$R^{11}$  and  $R^{22}$  are each, independently of one another: H; F; Cl; Br; CN; SCN;  $SF_5$ ; a chiral or achiral alkyl having up to 30 carbon atoms, which is optionally unsubstituted or monosubstituted or polysubstituted by F, Cl, Br, I or CN, and in which one or more non-adjacent  $CH_2$  groups are each, independently of one another, optionally replaced by -O-, -S-, -NH-, -N(CH<sub>3</sub>)-, -CO-, -COO-, -OCO-, -OCO-O-, -S-CO-, -CO-S-, -CH=CH- or -C≡C- in such a way that O atoms are not linked directly to one another; or are a polymerizable group, where at least one of the radicals  $Y^1$ ,  $Y^2$ ,  $Y^3$  and  $Y^4$  is  $M-R^{22}$ ,

- compounds of the formula XV



in which

$R^{11}$  and  $R^{22}$  are each, independently of one another: H; F; Cl; Br; CN; SCN;  $SF_5$ ; a chiral or achiral alkyl having up to 30 carbon atoms, which is unsubstituted or monosubstituted or polysubstituted by F, Cl, Br, I or CN, and in which one or more non-adjacent  $CH_2$  groups are each, independently of one another, optionally replaced by -O-, -S-, -NH-, -N(CH<sub>3</sub>)-, -CO-, -COO-, -OCO-, -OCO-O-, -S-CO-, -CO-S-, -CH=CH- or -C≡C- in such a way that O atoms are not linked directly to one another; a chiral radical containing one or more aromatic or aliphatic ring groups, which optionally contains fused or spiro-linked rings and one or more heteroatoms; or a polymerizable group,

$X^{11}$  and  $X^{22}$  are each, independently of one another,  $-CF_2O-$ ,  $-OCF_2-$ ,  $-CF_2S-$ ,  $-SCF_2-$ ,  $-CF_2CH_2-$ ,  $-CH_2CF_2-$ ,  $-CF_2CF_2-$ ,  $-CF=CH-$ ,  $-CH=CF-$ ,  $-CF=CF-$  or a single bond,

$Z^{11}$  is in each case, independently of one another,  $-O-$ ,  $-S-$ ,  $-CO-$ ,  $-COO-$ ,  $-OCO-$ ,  $-O-COO-$ ,  $-CO-N(R^{00})-$ ,  $-N(R^{00})-CO-$ ,  $-OCH_2-$ ,  $-CH_2O-$ ,  $-SCH_2-$ ,  $-CH_2S-$ ,  $-CF_2O-$ ,  $-OCF_2-$ ,  $-CF_2S-$ ,  $-SCF_2-$ ,  $-CH_2CH_2-$ ,  $-CF_2CH_2-$ ,  $-CH_2CF_2-$ ,  $-CF_2CF_2-$ ,  $-CH=CH-$ ,  $-CF=CH-$ ,  $-CH=CF-$ ,  $-CF=CF-$ ,  $-C\equiv C-$ ,  $-CH=CH-COO-$ ,  $-OCO-CH=CH-$  or a single bond,

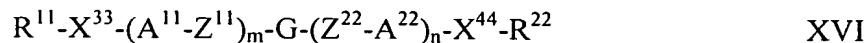
$R^{00}$  is H or alkyl having from 1 to 4 carbon atoms,

$A^{11}$  and  $A^{22}$  are each, independently of one another: 1,4-phenylene, in which, in addition, one or more CH groups are optionally replaced by N; 1,4-cyclohexylene, in which one or two non-adjacent  $CH_2$  groups are optionally replaced by O and/or S; 1,3-dioxolane-4,5-diyl; cyclohexenylene; bicyclo[2.2.2]octylene; piperidine-1,4-diyl; naphthalene-2,6-diyl; decahydronaphthalene-2,6-diyl; or 1,2,3,4-tetrahydronaphthalene-2,6-diyl, where all of these groups are unsubstituted or monosubstituted or polysubstituted by halogen, CN or  $NO_2$  or alkyl, alkoxy, alkylcarbonyl or alkoxycarbonyl having from 1 to 7 carbon atoms, in which one or more H atoms are optionally replaced by F or Cl, and

$m$  is 1, 2, 3, 4 or 5,

provided that at least one of the radicals  $X^{11}$ ,  $X^{22}$  and  $Z^{11}$  is  $-CF_2O-$ ,  $-OCF_2-$ ,  $-CF_2S-$ ,  $-SCF_2-$ ,  $-CF_2CH_2-$ ,  $-CF_2CF_2-$ ,  $-CF=CH-$  or  $-CF=CF-$  and at least one of the radicals  $R^{11}$  and  $R^{22}$  is a chiral group,

- compounds of the formula XVI





in which

$R^{11}$  and  $R^{22}$  are each, independently of one another: H; F; Cl; Br; CN; SCN;  $SF_5$ ; or a chiral or achiral alkyl having up to 30 carbon atoms, which is unsubstituted or monosubstituted or polysubstituted by F, Cl, Br, I or CN, and in which one or more non-adjacent  $CH_2$  groups are each, independently of one another, optionally replaced by -O-, -S-, -NH-, -N( $CH_3$ )-, -CO-, -COO-, -OCO-, -OCO-O-, -S-CO-, -CO-S-, -CH=CH- or -C $\equiv$ C- in such a way that O atoms are not linked directly to one another; or a polymerizable group,

$X^{33}$ ,  $X^{44}$ ,  $Z^{11}$  and  $Z^{22}$  are each, independently of one another, -O-, -S-, -CO-, -COO-, -OCO-, -O-COO-, -CO-N( $R^{00}$ )-, -N( $R^{00}$ )-CO-, -OCH $_2$ -, -CH $_2$ O-, -SCH $_2$ -, -CH $_2$ S-, -CF $_2$ O-, -OCF $_2$ -, -CF $_2$ S-, -SCF $_2$ -, -CH $_2$ CH $_2$ -, -CF $_2$ CH $_2$ -, -CH $_2$ CF $_2$ -, -CF $_2$ CF $_2$ -, -CH=CH-, -CF=CH-, -CH=CF-, -CF=CF-, -C $\equiv$ C-, -CH=CH-COO-, -OCO-CH=CH- or a single bond,

$R^{00}$  is H or alkyl having from 1 to 4 carbon atoms,

$A^{11}$  and  $A^{22}$  are each, independently of one another: 1,4-phenylene, in which one or more CH groups are optionally replaced by N; 1,4-cyclohexylene, in which one or two non-adjacent  $CH_2$  groups are optionally replaced by O and/or S; 1,3-dioxolane-4,5-diyl; cyclohexenylene; bicyclo[2.2.2]octylene; piperidine-1,4-diyl; naphthalene-2,6-diyl; decahydronaphthalene-2,6-diyl; or 1,2,3,4-tetrahydronaphthalene-2,6-diyl; where all these groups are unsubstituted or monosubstituted or polysubstituted by halogen, CN or  $NO_2$  or alkyl, alkoxy, alkylcarbonyl or alkoxy carbonyl having from 1 to 7 carbon atoms, in which one or more H atoms are optionally replaced by F or Cl,

m and n are each, independently of one another, 1, 2, 3 or 4, and

G is a bivalent chiral group,

in which at least one of the radicals  $X^{33}$ ,  $X^{44}$ ,  $Z^{11}$  and  $Z^{22}$  is  $-\text{CF}_2\text{O}-$ ,  $-\text{OCF}_2-$ ,  $-\text{CF}_2\text{S}-$ ,  $-\text{SCF}_2-$ ,  $-\text{CF}_2\text{CH}_2-$ ,  $-\text{CF}_2\text{CF}_2-$ ,  $-\text{CF}=\text{CH}-$  or  $-\text{CF}=\text{CF}-$ .